



REPORT
ON THE
CARBONIC ACID GAS TREATMENT
OF
MALARIOUS FEVERS.

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SECOND EDITION.

EDINBURGH:
MACLACHLAN AND STEWART.
1889.

R38983

PREFACE TO SECOND EDITION.

THE first edition of this report had the misfortune to have been submitted during an official *inter-regnum*, and did not, as I anticipated, receive the attention of Government to a sufficient extent. For such, however, nobody is to blame, and I rather rejoice than otherwise that circumstances prevented more notice being taken of it, till I had stronger corroborative evidence of the efficacy of the treatment of malarious fevers by Carbonic Acid Gas, than that which I possessed at the period when the first edition was launched into publicity.

It is my intention in the present edition to publish the same report, adding thereto some of the numerous letters received from well-known sources, together with certain comments upon them, which will, I hope, further elucidate this method of treatment and simplify my plans, so that the public may benefit thereby, and the report have a wider circulation in localities where medical aid is not easily procurable. Some of these letters, and my comments thereon, will warn people against errors that have been made by sufferers, who have either not studied the report carefully, or who through ignorance of chemistry were unable to distinguish between right and wrong in the details of my method of treatment.

I may mention that the Carbonic Acid Gas treatment of malarious fevers has been thoroughly tested by me in both hospital and private practice, and the eight years of

additional experience in its use, since my report was first issued, has confirmed my opinion as to its efficacy, when all the usual remedies have failed to effect a cure of a radical nature.

A quotation from Fagge's *Principles and Practice of Medicine*, published in 1888, reads thus, with reference to Quinine as a remedy for Ague: "In certain cases, especially such as are of long standing and of Quartan type, the remedy seems *altogether to fail*." This testimony concerning the impotence of Quinine, by a work pronounced the best writing on the subject in the English language, shows that some more powerful agent is called for. It is stated in the report that follows that Carbonic Acid Gas is as efficacious (if not more so) in curing long standing cases as those of short duration, after Quinine and other medicines have failed.

No. 100/p.

Dated at Tharrawaddy the 1st September 1881.

FROM

THE CIVIL SURGEON,

Tharrawaddy.

TO

THE DEPUTY-SURGEON GENERAL,

British Burmah.

SIR,

I have the honour to bring to your notice the discovery of an infallible antidote for malarious fevers of all types and durations in Carbonic Acid Gas.

My object in giving publicity to the above fact is to diminish the enormous expenditure of money necessitated for the maintenance of a sufficient supply of Quinine, the mixed alkaloids of Cinchona, &c., which have all been used hitherto as remedies for this scourge of the human race, but have in hundreds of cases proved ineffectual in eradicating the disease from the system. The disease has become chronic, and produced organic diseases that have caused further outlay, by compelling officers in the superior grades of the service to proceed on leave, or deprive the state of their valuable services prematurely.

Apart from the question of pecuniary losses for the curing of each case of protracted fever in Government Charitable Hospitals and Dispensaries, must be considered the time taken for the complete cure and discharge of military men, particularly in times of war; which would not (by the proper administration of this antidote in the manner described hereafter, in detail) require more than three days—allowing two more for rest after convalescence.

When organic disease has been established already, as the result of chronic fever, though this remedy will cure the fever in a very short time with certainty, the

organ or organs affected may keep the patient in a condition of incapacity for active service for some time. At some future period, however, when every case of fever is treated from its commencement by means of the Carbonic Acid, we may anticipate no organic disease as a sequel to it, because this antidote not only checks each paroxysm (which is all that can be effected by Quinine and the Cinchona alkaloids), but permanently neutralises all the malarious poison in the system at the time, and renders the patient thoroughly cured and not liable to periodical returns of febrile paroxysms; these recurrences being almost the rule after the other remedies for fever, hitherto used, have been in requisition.

I have the honour to state that this discovery was not made by me, but by Dr John Parkin of London. All I have done has been to introduce its use into this country, and having convinced myself of its marvellous efficacy, now desire to benefit Government and their subjects in India, Burmah, and elsewhere.

Dr Parkin first experimented with this gas—Carbonic Acid—when visiting the marshy and malarious districts of Italy, Spain, and the west coast of Africa.

He enters at great length into the Pathology of Intermittent Fever, and the *modus operandi* of the gas on the malarial poison. To be as brief as possible, compatible with being explicit, I shall only extract in a few short paragraphs the substance of his theories, a perfect understanding of which is necessary for the purpose of exercising proper management in the administration of the antidote, as it has been found much more efficacious at certain stages of a paroxysm than at others.

1. The remote cause of Intermittent Fever is the presence in the atmosphere of a specific poison to which the term malaria is usually applied.

Pathology of Intermittent
Fever.

2. The immediate or proximate cause is the presence of this morbid agent in the blood.

3. The accumulation and conservation of the poison take place in the venous system, being introduced slowly and gradually through the lungs with the air inspired.

4. In the cold stage of the disease the poison is situated

in the capillaries of the lungs, producing by its presence spasm and contraction of these vessels, with arrest of the circulation to a greater or less extent.

5. In the febrile or hot stage the same morbid matter is confined in the systemic capillaries, having been transported thither with the current of blood on the cessation of the cold stage.

6. Although the poison during the above periods is contained in the blood, the effects previously described are not produced by any alteration in the properties of this vital fluid, but are due solely and entirely to the presence and toxic effects of the morbid matter on the nervous system—vaso-motor centres particularly.

7. This poison during the intermission is contained in the venous system, into which it has been propelled on the termination of the hot stage.

8. It is to this circumstance—viz., the retention of the poison in the venous system for a variable time, until another paroxysm has been produced—that we must ascribe the periodicity of Intermittent Fever.

Dr Parkin then proceeds to narrate the circumstances which led him to employ Carbonic Acid Gas as a remedial agent against the attacks of fever which came under his observation. He remarked, having suffered himself from the operations of malaria, that if not produced by the same causes, some of the effects were similar to those observed in the class of poisons, termed septic. He was, therefore, led to infer that carbon and its compounds would be, or ought to be, antidotes for the poison productive of these effects, and specifics for the diseases arising from the operation of malaria in the human frame. As is familiarly known, if a piece of putrid meat be suspended in an atmosphere of Carbonic Acid, it is soon rendered sweet, if the volume of gas is sufficiently large. It is in accordance with all the facts presented to our notice to conclude that the putrid matter is not only attracted by the gas, but that it is also decomposed by it and rendered innocuous. This is undoubtedly the case with common charcoal or carbon, which has the property, not only of absorbing, but decomposing many gaseous compounds.

Discovery of the antidotal effect.

As Carbonic Acid is the agent employed, the inference is that when taken into the stomach it is absorbed by the veins of that organ and of the small intestines, and carried forward with the circulating current to the great venous centres and pulmonary organs, passing out of the system again with expired air. This is the case with other gaseous substances and the Carbonic Acid naturally existing in the system—it being now concluded that this gas is not produced in the lungs, but in the systemic capillaries.

For reasons that will be apparent, by a reference to the pathology of intermittent fever, the gas was first administered about two hours before the usual accession of the paroxysm, so as to enable the patient to take four or five doses of the remedy prior to the commencement of the cold stage; the draughts being taken at intervals of half an hour or less.

In these cases the paroxysm was invariably cut short, often prevented altogether, while if the remedy continued to be taken in a similar manner on subsequent days of the accession, the disease was arrested in a shorter time, and with more certainty, than by any other known medicine or combination of drugs. This will be evident by a reference to the cases hereafter described.

There is some immediate benefit derived if the gas is administered at the very commencement of the cold stage—the paroxysm is considerably shortened. Thus, if the attacks previous to the adoption of this treatment lasted four hours, the one following would be reduced to about two hours, the cold stage ceasing in a very short time. The comparative inefficacy of the antidote in this stage is accounted for by the fact that when venous congestion exists, owing to constriction of the pulmonary capillaries which occurs in this stage, the absorption of liquids, and even gaseous substances, is greatly if not altogether prevented.* More than this, it has been concluded that the poison is during this stage lodged temporarily in the capillaries of the lungs, which, being in a constricted condition, would

* The cold stage of Ague corresponds to the collapse stage of Cholera, in which remedies taken into the stomach cannot be absorbed.

not admit the gas (even if the veins could absorb it in sufficient quantity during their congested state) to neutralise the poison. Nor could the Carbonic Acid Gas be brought into contact with the poison subsequently, as this matter is—according to the deduction previously drawn—propelled into the arterial system while the greater portion of the remedy escapes from the lungs with expired air.

The remedy produced slight benefit (compared with the results of its administration in the premonitory stage) scarcely perceptible at

Effects in hot stage.

the moment. If given at the same period on subsequent accessions of the paroxysm the fever was shortened, but time was lost, and a patient cannot conscientiously be kept for experiment and allowed to suffer for a longer period than those around him who have been given it in the premonitory stage.

When the gas is administered immediately after the sweating stage, the benefit is little more than is obtained by its employment during the hot stage, particularly when the intervals are long, as in the Tertian and Quartan types of Intermittent Fever.

Effects of gas during the interval between paroxysms.

The benefit derived, however, by the use of Carbonic Acid Gas was found to be in direct proportion to the proximity of the period of its administration to the return or accession of a febrile paroxysm, provided that sufficient time is given to administer four or five doses of the remedy at the intervals before mentioned.

General conclusions.

As already explained, the antidote cannot reach the malarial poison to neutralise it in the

hot stage of an Intermittent Fever nearly as well as it does in the premonitory stage, owing to the waste that occurs by its being expired in part. It is not possible, therefore, to obtain such prompt and beneficial results in remittent and continued fevers as are obtained in the intermittent types by the employment of the same agent, unless it is resorted to at the very commencement of these diseases, or in the formative stage. The gas if given in the febrile stage acts by a portion being carried along with the current of blood

Effects in simple continued and Remittent Fever.

through the lungs and forward to the systemic capillaries, to neutralise the poison lodged there. I have administered it with this object in view, by giving a series of doses (four in each) every four hours, with the most happy results—viz., checking these fevers in two or three days.

Dr Parkin recommends that some vegetable acid together with sugar (owing to these substances containing hydro-carbonaceous elements in excess) be given to expedite recovery by their conversion into Carbonic Acid. This takes place by the union of the hydrogen with oxygen and the production of water; while Carbonic Acid is formed by the carbon in the systemic capillaries, and acts on the malarial poison it meets there.

He has also checked these forms of fever by the occasional inhalation of the gas diluted with air.

I have not found the last two methods of procedure necessary, as my cases have recovered without them in a very short time—much shorter than could ever be effected by Quinine, &c.

Dr Parkin does not describe any cases demonstrating the effect of this remedy on surgical fevers. One such case (the effect of septic mischief due to absorption from a wound mismanaged before the patient's admission into hospital) has recently come under my observation, on which the gas—given in series of four doses, every four hours—had a marked antipyretic effect, and removed the fever in two days. Further trial will, however, be necessary before I can venture to recommend its regular administration in this type of fever.*

As I have undertaken the responsibility of introducing the use of this antidote for fever into this country, it appears to be incumbent upon me to explain what led me to the adoption of such a method of treatment, and I hope it may be apparent that, in doing so, no hasty or unsupported conclusions have been arrived at; but that, on the contrary, I have observed both its immediate and permanently curative effects during the last fifteen months, and every experiment has been carefully performed—the first two, I must confess,

* I have since used the gas in surgical fevers with the most speedy beneficial effects.

with a certain poverty of faith. It was hard, indeed, to cast aside my old established faith in Quinine, and I only tried Carbonic Acid Gas, as (taken in the method to be described) it is so thoroughly innocuous to both old and young.

The first subject for experiment I determined should be one upon whom the effects of the remedy (both immediate and remote) could be

Case I.

constantly watched, and every little result, for better or worse taken into consideration. This patient was my wife. The fever was contracted in Akyab in April 1879, and commenced in the form of a remittent attack, which lasted for a fortnight, and was accompanied by delirium and jaundice. Her life was at one period despaired of.

Quinine, Arsenic, Sulphurus Acid, aided by cholagogue purgatives, and several other remedies, were tried, but proved ineffectual. The fever ran its course, arrived at its crisis, and left her fearfully prostrated. It returned in a month, assuming the Tertian type, which continued to trouble her for a week or ten days and ceased, only to return, however, in the same form every month or so. In the month of December of the same year she left Akyab for Calcutta, and had a return of the febrile paroxysm on the voyage, which continued on her for eight days. She returned to Burmah (Tharrawaddy) whither I had been transferred; but the fever recurred at irregular intervals of less than two months till the 16th May 1880, when I tried the Carbonic Acid Gas treatment.

The first paroxysm of this, her final attack, set in on the date mentioned. As her former experience of the symptoms of lassitude and general uneasiness were warnings of the approach of this paroxysm, and gave me time to administer two doses of the gas before the accession of the cold stage, this—which used to be very severe and continue for one hour—only lasted a quarter of an hour, and was followed by the hot and sweating stages without delirium (which generally accompanied her previous attacks), the entire length of the paroxysm being reduced to two hours instead of five, the usual duration of her former attacks.

A series of four doses (each of which contained Bicarbonate of Soda gr. xxx and Tartaric Acid gr. xx) was

administered after the sweating stage in the manner to be described in detail.

18th May.—Three doses of gas, at intervals of half an hour, given during the premonitory stage, when the accession commenced, without any cold stage, and lasted one hour and a quarter only, and very slightly.

20th May.—Four doses of gas given an hour before the time fever usually began. No accession of paroxysm. Another series of draughts given the same afternoon, after which the gas was discontinued.

From this time there has been no recurrence of fever, although more than fifteen months have elapsed.*

What would I not have given to have been in possession of the knowledge of this remedy at the beginning of my wife's illness in Akyab! She is now suffering from Chronic Hysteria, the result of her repeated attacks of fever, which she need not have had a week, and has suffered under, from April 1879 to May 1880, till this new remedy was administered.

The next patient was our "Ayah"—an old woman of about 48 years of age—who suffered from the so-called "Arracan Fever"

Case II.

while in Akyab; went to Calcutta and returned to Burmah (Tharrawaddy) with the same fever in her system, which assumed the chronic Quartan type, and recurred at intervals varying from four to five months. Quinine was given in large doses (gr. xx) as the attacks commenced, but she continued to experience four paroxysms with every recurrence. Her first attack, after my knowledge of the antidote, occurred on the 6th of June 1880. The gas was given in four doses during the febrile or hot stage, as she did not give notice of the attack having commenced till enquiry was made as to the cause of her absence from her duties. The result was almost immediate diaphoresis and subsidence of the fever, which enabled her to resume work after a rest of two hours.

9th June.—Having warned her to give notice when the return of fever threatened, she asked for the medicine accordingly in the premonitory stage, but the chill set in after the administration of two doses of the gas. It lasted only five minutes instead of an hour, and the hot stage one

* She has had no recurrence for the last nine years.

hour instead of three, as in former attacks. Four doses of gas were given after the paroxysm ceased.

12th June.—Warning given an hour before the time the attack was expected. Four doses of gas given—one every fifteen minutes—result, no fever returned. Cured.

This woman remained in our service nine months after this attack, and no recurrence of her fever was experienced.

Mr Poport, Deputy-Conservator of Forests, Tharrawaddy, suffered from a Tertian Ague contracted in the Prôme District when

Case III.

on duty in the forest. Fever commenced some two years ago—paroxysms lasting three hours; attacks returned every three months, accompanied by bilious symptoms.

Quinine and cholagogue purgatives tried regularly, but without effect, beyond curtailing attacks. Carbonic Acid Gas treatment first tried on 10th December 1880 in hot stage—result, fever shortened in one hour by early accession of sweating stage.

12th December.—Gas given in premonitory stage; four doses—one every quarter of an hour—result, no fever. Cured.

This officer availed himself of furlough about five months after this, not having experienced any return of fever during the interval.

Chiekoor, a groom in my service, who came over from India in November 1880, having contracted a Quotidian Ague in Calcutta

Case IV.

about six months before he left. First attack in Tharrawaddy on the 3rd of January 1881. Applied for treatment on the second day of fever when in hot stage; four doses given at intervals of twenty minutes—result, diaphoresis after one hour, when fever ceased.

5th January.—Two doses only could be administered in premonitory stage—result, moderation of chill; total duration of paroxysm two hours instead of five, as on first day before treatment commenced.

6th January.—Three doses given in premonitory stage; no fever at all, gas not continued.

7th January.—No accession of fever. Cured.

NOTE.—This man is still with me, and has not had any fever since, though he has had to visit low swampy tracts to cut grass.

Having made these experiments, I was unable to proceed any further in the matter, owing to the work required to prepare for an examination in the Burmese language, which was to be held in June. Moreover, the cases admitted into the hospital, were few and at long intervals. I determined, then, to wait for the period when fever became prevalent, to obtain a regular influx of cases for experiment, and commenced treating them just as they were admitted in the month of July, which in Burmah is a feverish month. The result of the experiments, as well as those narrated in detail, I have tabulated for convenience for reference as to the time required by the cases to leave hospital—cured. I shall include in this tabular statement Dr Parkin's cases, which he described in detail; but as these details are so uniformly successful, and very similar to those already described by me, the above-mentioned method will suffice to place in a succinct and clear form for reference the results—minute descriptions of which would require several pages to contain them.

It seems rather misanthropic (if he will forgive my using the term) on the part of Dr Parkin—a man of world-wide experience—judging from the dates of his experiments, to keep the knowledge of such a discovery confined within such limited areas, instead of publishing it for the benefit of his fellow creatures, before the year 1878. He states that his experiments would have been more numerous if he had charge of a hospital in the districts visited by him. Instead of this, his efforts were crippled by professional jealousy on the part of some physicians, in whose wards his experiments were conducted by special permission.

It has been shown in the experiments before detailed that the effect was slight when the
Remarks on experiments with explanation of mode of administration. antidote was given in the febrile stage, although such speedy and almost instantaneous results were produced when administered during the intermission, and particularly just before the accession of each paroxysm. The cause of these differences in its efficacy, has already been explained under the head “modus operandi of gas on the poison and proper time for administering the same.” The great *desideratum*, there-

| Age. | Name. | Type of Fever. | Previous duration of Disease. | Usual duration of Paroxysms. | Commencement of Treatment. | Number of Attacks after. | Duration of Treatment by Gas. | Date of Discharge. | Remarks. |
|---------------------------------------|-----------------------|--------------------------|-------------------------------|------------------------------|----------------------------|--------------------------|-------------------------------|--------------------|---|
| 30 years | Rita Garcia ... | Intermittent (Quotidian) | 10 months | 5 hours | 6 | 2 35 | 4 days | 17 2 35 | 7 days' rest |
| 34 " | Autana Alnorhea ... | " (Tertian) | 6 " | 13 " | 20 2 35 | one | 3 " | 25 2 35 | " All these had been treated by Quinine before the Gas was tried. |
| 30 " | La Linora ... | " " | 7 " | 4½ " | 25 2 35 | one | 3 " | 2 3 35 | " |
| 19 " | Blas Alan ... | " " | 11 " | 8½ " | 5 9 35 | none | 4 " | 28 9 35 | " |
| 18 " | Manuel Estreuous | " (Quotidian) | 4 days | 6 " | 6 9 35 | five | 6 " | 15 9 35 | " |
| 19 " | Pedro Gutirrey ... | " (Quartan) | 3 " | 6 " | 15 9 35 | one | 3 " | 26 9 35 | " |
| 12 " | Joaquim Gosalvez | " (Quotidian) | 1 month | 8 " | 12 2 35 | one | 5 " | 18 2 35 | " |
| 20 " | Juan Leldran ... | " (Tertian) | 7 days | 3½ " | 25 8 35 | one | 5 " | 3 9 35 | " |
| 40 " | Franciscs Yanez | " " | 17 " | 10 " | 28 8 35 | two | 6 " | 7 9 35 | " |
| 50 " | Pedro Trebino ... | " (Quotidian) | 14 " | 8 " | 15 9 35 | none | 5 " | 22 9 35 | " |
| 37 " | Pedro Gosalvez ... | " " | 30 " | 2½ " | 15 9 35 | none | 4 " | 22 9 35 | " |
| 22 " | Mannel John ... | " (Tertian) | 3 " | 4½ " | 21 8 35 | none | 4 " | 9 9 35 | " |
| <i>Last of Cases treated in Rome.</i> | | | | | | | | | |
| 27 years | Domine Biearelli | Intermittent (Tertian) | 2 months | 12 hours | 8 4 58 | none | 4 days | 12 4 58 | These cases were previously treated by Quinine. |
| 24 " | Lingi Vincino | " (Quotidian) | 10 days | 6 " | 14 4 58 | one | 4 " | 19 4 58 | " |
| 33 " | Filipe Euchotti | " (Tertian) | 8 " | 12 " | 19 4 58 | one | 4 " | 26 4 58 | " |
| 25 " | Abile Stapanelli | " " | 9 " | 8 " | 23 4 58 | none | 5 " | 29 4 58 | " |
| 20 " | Filips Gentile | " " | 2 " | 2½ " | 6 4 58 | none | 4 " | 10 4 58 | " |
| 21 " | Pasxuale Borgini | " (Quotidian) | 2 " | 1½ " | 7 4 58 | none | 3 " | 10 4 58 | " |
| 20 " | Lingi Frati ... | " (Tertian) | 3 " | 5 " | 7 4 58 | one | 3 " | 14 4 58 | " |
| 13 " | Lingi Bartoli | " " | 4 " | 3 " | 8 4 58 | none | 3 " | 12 4 58 | " |
| 23 " | Sautolo Sartzoli | " (Quotidian) | 3 " | 9 " | 8 4 58 | one | 5 " | 13 4 58 | " |
| 22 " | Lingi Marinelli | " (Tertian) | 10 " | 3 " | 8 4 58 | one | 6 " | 15 4 58 | " |
| 11 " | Natali Cochioti | " (Quotidian) | 21 " | 2½ " | 14 4 58 | none | 4 " | 19 4 58 | " |
| 13 " | Antonia Piacentini | " (Quotidian) | 42 " | 3 " | 15 4 58 | one | 4 " | 19 4 58 | " |
| 22 " | Pietro Caparruchi | " (Tertian) | 7 months | 10 " | 16 4 58 | one | 5 " | 21 4 58 | " |
| 38 " | Franciso Napoleons... | " (Quartan) | 6 days | 9 " | 20 4 58 | none | 4 " | 26 4 58 | " |
| 19 " | Filips Piermettie | " (Tertian) | 10 " | 5 " | 22 4 58 | one | 10 " | 3 5 58 | " |
| 17 " | Francisco Cuillioni | " (Tertian) | 12 " | 7 " | 23 4 58 | one | 8 " | 3 5 58 | " |

Patient neglected orders concerning self management.

List of Cases treated in Tharrawaddy, British Burmah.

| Age. | Name. | Type of Fever. | Previous duration of Disease. | Usual duration of Paroxysms. | Commencement of Treatment. | Number of Attacks after. | Duration of Treatment by Gas. | Date of Discharge. | Remarks. |
|----------|---------------------|----------------------------|-------------------------------|------------------------------|----------------------------|--------------------------|-------------------------------|--------------------|--|
| 25 years | Mrs Naylor ... | Intermittent (Tertian) | 13 months | 5 hours | 16 5 80 | two | 3 days | private ease | Quinine failed in previous treatment. |
| 30 " | Mr Poport ... | " | 2 years | 3 " | 10 12 80 | one | 2 " | " | |
| 36 " | Chickoor ... | " (Quotidian) | 9 months | 5 " | 3 6 81 | two | 3 " | " | |
| 48 " | Abeer ... | " (Quartan) ... | 9 " | 4 " | 6 8 80 | two | 3 " | " | |
| 30 " | Moung Tsan Aik | " (Quotidian) | 1 day | 6 " | 7 8 81 | two | 3 " | 11 8 81 | |
| 22 " | Moung Thah Gone | Remittent Fever | 3 " | 12 " | 18 8 81 | one | 3 " | 22 8 81 | |
| 20 " | Doogah ... | Intermittent (Quotidian) | 7 " | 3 " | 26 7 81 | none | 2 " | 29 8 81 | |
| 28 " | Ramdaal ... | " (Tertian) | 12 " | 3 " | 6 8 81 | one | 2 " | 11 8 81 | |
| 20 " | Moung Hpo Yin | " (Quotidian) | 1 year | 6 " | 12 7 81 | two | 2 " | 15 7 81 | |
| 35 " | Khoda Bux ... | Remittent Fever | 15 months | 10 " | 12 7 81 | three | 3 " | 20 7 81 | |
| 28 " | Sukul... .. | Simple continued fever ... | 2 " | each attack contd. 4 dys. | 22 8 81 | fever ceased on 2nd day | 2 " | 25 8 81 | No previous treatment. |
| 24 " | Moung Thine | Intermittent (Quotidian) | 4 days | 8 " | 29 8 81 | none | 2 " | 31 8 81 | |
| 22 " | Moung Thah Kadoe... | " | 3 " | 10 " | 2 9 81 | one | 3 " | 8 9 81 | |
| 60 " | Mr D'Silva ... | " | 5 " | 5 " | 3 9 81 | none | 2 " | 8 9 81 | |
| 35 " | Oodhee Singh ... | " (Tertian) ... | 9 months | 10 " | 17 9 81 | one | 3 " | 20 9 81 | |
| 29 " | Beesoon ... | " (Quotidian) | 2 days | 6 " | 17 9 81 | none | 3 " | 20 9 81 | |
| 35 " | Kassim ... | " | 15 months | 8 " | 26 9 81 | none | 2 " | 29 9 81 | |
| 32 " | Danger Singh ... | " | 1 " | 8 " | 2 10 81 | none | 3 " | 5 10 81 | |
| 6 " | Moung Loo ... | Simple continued fever ... | 1 day | 5 days | 23 10 81 | ceased on 2nd day | 2 " | 25 10 91 | |
| 40 " | Bajnauth ... | Intermittent (Tertian) | 3 months | 13 hours | 25 10 81 | two | 3 " | 31 10 81 | These cases have been added to the list submitted with the report on the 1st Sept. 1881. |
| 20 " | Moung Chan Ay | " (Quotidian) | 3 days | 3 " | 3 11 81 | one | 3 " | 7 11 81 | |
| 25 " | Sawmy ... | Remittent Fever | 4 months | 8 " | 31 10 81 | three | 4 " | 4 11 81 | |
| 23 " | Golanb ... | Intermittent (Quotidian) | 7 days | 10 " | 10 11 81 | none | 2 " | 12 11 81 | |
| 40 " | Narsawmy ... | " | 3 " | 5 " | 6 11 81 | none | 2 " | 8 11 81 | |

fore, is to obtain information from the intermittent fever patient, as to when he or she expects the accession of the paroxysm to enable us to administer four or five doses at intervals (varying according to the circumstances and urgency of each case) of between a half and a quarter of an hour.

Simple continued fever is best checked by giving the gas during the almost imperceptible remission that occurs at some period in the course of every twenty-four hours of the paroxysm. Failing to find this particular stage it should be given in a series of draughts (as described) every fourth hour.

In Remittent Fever the gas is most efficacious during the remission, and particularly an hour or two before the exacerbation of the febrile symptoms. When a sufficiently large and intelligent staff is not attached to a hospital to carry out the instructions, the gas should be given (in four-draught doses) every fourth hour, at the intervals before described, in both remittent and simple continued fever.

The gas in an administrable form can be obtained for present purposes in the cheapest form, simply by dissolving Bicarbonate of Soda gr. xxx in three ounces of cold water, and throwing into the solution Tartaric Acid gr. xx in a *powdered* state, the mixture to be stirred rapidly once, and swallowed as soon as possible *in a state of effervescence*. The patient must be made to *lie down immediately after*, to prevent eructation and *escape of the gas*, so apt to occur in a *sitting posture*. For some private cases, owing to its convenient form for administration, I have used the patent preparation known as "Eno's Fruit Salt," in half teaspoonful doses, at the usual intervals, with the same effect.*

Production of gas for administration.

The doses of soda and acid must of course be decreased to suit the different ages of children, as gr. xxx. of Bicarbonate of Soda are not soluble in the small quantity of water suitable for administration in one dose, to very young children.

In some cases the gas rising into the nostrils in a state

* Any remedy which effervesces in water, will suit, in proper doses.

undiluted by air during the process of drinking, produces an unpleasant suffocated feeling, and the patient may object to swallow the draught, till almost all the gas *escaped*, which of course, would *render it useless*.

In such cases I have made the patient lie on his or her back, and swallow, first the solution of soda gr. xxx in two ounces of water (as too large a quantity of water is objectionable in some cases), and immediately after swallow a solution of the gr. xx of Tartaric Acid in one ounce of water; the gas being formed in the stomach when the solutions meet. This method is the best in surgical fever, when change of position may be dangerous or inconvenient.

For children and fastidious female patients I give the solution of soda first, and immediately after it the solution of acid rendered pleasant by the admixture of a small quantity of sugar—as the latter does not impair the action of the acid.

I have endeavoured to be as explicit as possible in the above minutiae of description, perhaps at the risk of being accused of prolixity.

Conclusion.

There are a few circumstances well worthy of consideration in drawing this report to its termination.

By a reference to the preceding tabular statement it will be evident that the result of this treatment is nearly the same in all—in those of the longest, as well as those of the shortest duration.

If there was any difference, it would appear (by comparison) to be in favour of the severest, the oldest, and most rebellious cases.

This is very different to that obtained from other remedies, whose efficacy generally diminishes in direct proportion to the duration of the disease.

It is also evident from the facts before detailed, that this antidote was as efficacious in those cases in which Quinine and other remedies had failed, as in those of recent origin, for which no other remedy had been tried. This is another proof, if it was needed, that Quinine is not a specific in ague; while it also shows that Carbonic Acid Gas is superior in efficacy to it and all other remedies

in the treatment of this and other types of malarious fever.

This is not all. In addition to its being the most efficacious of all remedies in the above diseases, Carbonic Acid Gas is at the same time the cheapest, and therefore the most easily obtained; infinitely more so than Quinine or the so-called Cinchona Febrifuge.

A comparative statement, taken from a price list of one of the leading London exporting druggists, stands thus:—

| | £ | s. | d. | |
|---|---|----|----|----------|
| Howard's Sulphate of Quinine, (per lb.) | 8 | 12 | 0 | in bulk. |
| { Bicarbonate of Soda, . . . (do.) | 0 | 0 | 3½ | do. |
| { Acid Tartaric, . . . (do.) | 0 | 1 | 8 | do. |

When the fact that three ounces of soda and two ounces of acid are more than any of the cases described required for their complete cure—even calculated by these quantities—the radical cure of a case of fever would be reduced to something less than 3¼d., and this without the probability of having the recurrences of fever, which follow the Quinine treatment.

Finally, to meet the requirements of the masses of poor in fever-stricken districts, unable or unwilling to attend hospitals and dispensaries, measures should be adopted to spread the use of this cheap antidote. This can be effected by triturating in a *dessicated state*—the acid being hygroscopic—Bicarbonate of Soda and Tartaric Acid, in the proportion of three parts of the former to two of the latter, and preserving the mixed powder in well-stoppered bottles. Directions should be wrapped round each, indicating the way to administer the contents, and to preserve the same from damp.

The appalling number of deaths from fever recorded in the districts of Agra and Muttra was 32,439 in the former, and 33,634 in the latter, during the last *six months* of 1878–79 (*vide* Report of Sanitary Measures in India for 1878–79, page 43). In Burmah the deaths from this disease amounted to 26,373 in one year (*vide* Memo. of Army Sanitary Commission on Report of Sanitary Commissioner, British Burmah, page 1).

With these facts before us, it seems the duty of every man claiming possession of the smallest amount of philanthropy, to cause the knowledge of such an inestimable blessing to the human race (as a certain antidote for malarious fevers) to spread far and wide in as short a time as possible.

I have the honour, therefore, to submit this report through your office, with the hope that it may prove the most effectual plan for giving publicity to the discovery.

I have the honour to be,

Sir,

Your most obedient Servant,

CHARLES G. R. NAYLOR,

Civil Surgeon, Tharrawaddy.

The following letter was received from the Deputy-Surgeon General of Burmah in reply to mine, forwarding the above report to his address:—

No. 228/50, dated at Rangoon, the 18th March 1882.

“SIR,—I have the honour to acknowledge with thanks the receipt of a printed copy of your report on the treatment of malarious fever by Carbonic Acid Gas. If it proves as efficacious as it appears to be it will be of immense benefit to the country.”

I have the honour to be, &c.,

(Signed) W. PEARL,

Deputy-Surgeon General, British Burmah Division.

I received a communication from Deputy-Surgeon General Hutchinson of the Gwalior and Saugor districts of India, a copy of which follows:—

JUBBULPORE, the 28th of April 1882.

“MY DEAR SIR,—I have to thank you for your report on Carbonic Acid treatment of malarious fever given me by Mrs Bryne, on board the S. S. ‘Purulia.’ I have read it

with care and interest, but you nowhere show that Carbonic Acid, *per se*, has been the remedial agent, and on your evidence it is just as possible that the neutral or Acid Tartrate of Soda may have been the remedial agent. Try water only aerated with Carbonic Acid Gas, and then you will be certain as to the remedial effects of the gas."

Yours truly,

(Signed) H. F. HUTCHINSON,

*Officiating Deputy-Surgeon General,
Gwalior and Saugor Districts.*

My reply to the above was:—

"MY DEAR SIR,—In reply to your kind note of the 28th ultimo, I have much pleasure in stating that Carbonic Acid Gas is the sole remedial agent in my opinion for the following reasons:—

1st. Its rapidity of action in cases where fevers are cut short by the very first series of draughts, could not be accounted for by the absorption of any solid drug in solution, such as the Tartrate of Soda. A gaseous or volatile body only, could act thus.

2nd. When we have run short of soda and acid at the hospital, I have administered soda water (drunk from the bottle to prevent any waste of gas) with the same happy result, the only objection to its use in this form being the large quantity of water that has to be drunk, to carry with it a sufficient volume of Carbonic Acid Gas.

3rd. This gas has certain antiseptic properties, referred to in my report, which are not possessed by Tartrate of Soda.

It is the gaseous antiseptic which, according to the theory offered, enters the circulation and there neutralises the malarial poison.

Hoping these explanations may prove satisfactory, and thanking you for so kindly interesting yourself in the matter."

Yours truly,

(Signed) C. G. R. NAYLOR,

Civil Surgeon.

In addition to the above, I would here state that since this question was raised I have in all my hospital cases used a gazogene, in which nothing besides water impregnated with Carbonic Acid Gas has been the agent employed. Further, a reference to the letter from Mr Sutherland, in which he complains of the failure in some cases of this method of treatment, and asks if the *absence of effervescence* (due to deterioration of the soda and acid powders) might account for such failure, may convince the most sceptical. Of course, the absence of effervescence is evidence of the *absence of the gas*, while the failure in effect upon the fever of a gasless draught only proves that the solid ingredient or Tartrate of Soda has no curative effect. For convenience and easy reference, Mr Sutherland's letter to me is now inserted.

POUNGDEH, dated the 6th August 1882.

“DEAR SIR,—I have treated a number of people with your Carbonic Acid Gas system, and although I have found it very effective in some cases, it has not been uniformly successful. There are half a dozen of our people at present suffering, and I have had to resort to Quinine and solution of Arsenic. I have noticed that the powders *do not always effervesce* as described in your report, and this may be the reason for failure now. If you would order a fresh supply to be sent me to this place from a medical hall at Rangoon I should feel obliged. I have upon the whole thought so well of your treatment, that I have recommended it to several people.”

Yours truly,

(Signed)

R. SUTHERLAND,
Agent,

Bombay Burmah Trading Corporation,
Poungdeh.

The above letter shows that in spite of the gas being only imperfectly given (*i.e.*, when those powders that had not been spoiled by the damp weather in which they were

tried produced effervescence) a large number of successful cases were observed.

An extract from a note received earlier from Mr Sutherland runs thus:—"I should like to give this new antidote a trial. I have suffered severely from jungle fever, and have the dregs still in my system." A copy of my report was sent to him, and as I was desirous to know the result, I communicated with the principal office at Rangoon, not having received an answer to a letter sent to his address.

The reply was :—

RANGOON, 29th July 1882.

"DEAR SIR,—We are in receipt of your letter of the 21st instant, in reply to which we beg to say that Mr R. Sutherland's present address is at PROME; but he is frequently travelling in the district (jungles), which may account for his not having written to you. We have heard that your Carbonic Acid Gas has in his case proved successful in the cure of fever. We shall feel obliged by your sending us the prescription, together with full directions for using the medicine, as we are desirous of sending a supply of this to our employés in the forests."

We are, Dear Sir,

Yours faithfully,

(Signed) J. T. HEWITT,

for Bombay Burmah Trading Corporation.

As a sequel to this, I received another communication from the same Corporation which bears very clear testimony to the powerfully curative effect of the treatment advocated by me. I must invite special attention to the fact that the experiments were conducted in very malarious tracts, and by men quite untutored in administering medicines.

RANGOON, dated the 14th September 1882.

"DEAR SIR,—We are much obliged for the pamphlets which you sent us at our request.

“Your fever medicine has been tried at Mingyan, and our forest manager writes that the results have astonished him. He used the medicine in several cases, and relief was obtained almost instantaneously.

“He writes—‘I never was so much taken aback as when I first tried this medicine. I gave the patient two doses (during fever) within fifteen minutes, and he got up about ten or fifteen minutes afterwards declaring himself all right, and he has had no fever since.’

“We are sending up supplies of your medicine to our Chindwin and Mu forests.”

Yours faithfully,

pro Bombay Burmah Trading Corporation, Limited.

This method of treatment has stood the trying test of being used for the cure of patients who are constantly exposed to malarial influences, by their duties necessitating residence in the midst of dense jungles during several months of each year, so that the cures have been effected while the sufferers were living in the localities, the air of which was the cause of their ailment.

The letters which follow were received from officers belonging to a survey party working in the Tharrawaddy District.

THARRAWADDY DISTRICT SURVEY OFFICE.

“MY DEAR NAYLOR,—Many thanks for your report on the treatment of fever. My native doctor reports having cured a very old case of fever with your treatment. The man has had this fever hanging on him for the last year.

“I should like one or two copies more, as I wish to send one copy to my daughter at Huzareebagh, who has had fever on and off for the whole of last year.”

Yours sincerely,

(Signed) H. TALBOT,

Deputy-Superintendent of Survey of India.

SURVEY CAMP AT LETPADAN, dated 19th March 1882.

"MY DEAR SIR,—I have the pleasure to inform you that I have tried your remedy of Carbonic Acid Gas in all cases of fever with the most gratifying results. I also introduced its use into the survey party, of which I am a member, through the hospital assistant, who informed me that its efficacy in curing fever cases was beyond all question; and further, that relief was invariably obtained with the first four doses, given at intervals of half an hour, provided that the doses were administered just before the attack came on. I have found this to be of the first importance, since in my own case, after suffering for two months from Remittent Fever, during which I treated myself with the Carbonic Acid Gas, without due observance of the time specified for its use. I found little benefit; but after receiving your advice regarding the time for using the gas, the result was that after the first four doses the strength of the fever was broken, and I was entirely free from it in three days.

"Trusting that your gas treatment may obtain speedy and wide circulation."

I remain,

Yours faithfully,

(Signed) J. H. WILSON,
Surveyor.

In connection with the above severe case of Remittent Fever, I was applied to by Mr Wilson for further instructions as to details of treatment, besides those contained in my report. It was ascertained upon further inquiry by me as to the method in which he took the remedy, that he made *separate solutions* of both acid and soda and then mixed them. This mixture causes the effervescence to take place *too rapidly*, and long before the dose can be swallowed, the gas has escaped. I take this opportunity to draw attention to the directions in the report, where I emphasised the necessity of adding the acid in a powdered condition (not in solution) by printing the word *powdered* in italics.

The third letter from a member of a survey party is given below:—

SURVEY CAMP, WEH, dated 18th December 1881.

“DEAR SIR,—Many thanks for your report on the Carbonic Acid treatment of fever which I have received, and to lose no time, I have sent off to Rangoon for the Bicarbonate of Soda and Tartaric Acid, as already I have four men down with fever.

“I can now account for my recovery from jungle fever contracted in the Western Doorgas, Julpiguri. I had had two attacks per month for seven months. Just before the last, a friend gave me a bottle of Eno’s Fruit Salt, of which I took nearly half in twenty-four hours, and cured myself (as I thought) by the salt. Thanks to your report, I now know it to have been by the *Carbonic Acid* produced by it. I am extremely obliged to you for it.”

Yours truly,

(Signed) G. JARBO.
Surveyor.

I shall now insert proofs of the curative power of this gas treatment upon the well-known and dreaded “Arracan Fever.” Cases are on record of this particular malarious fever, after treatment by other means, adhering to the systems of its unfortunate victims, who have been relieved of attacks while resident in Arracan, only to experience similar recurrences of fever after years of residence in England; thus proving the inability of Quinine, &c., to eradicate the malarious poison from the system. There are cases, on the contrary, cured by Carbonic Acid Gas, who though unable to secure the advantages of this change to England, have been free from fever, in spite of a subsequent residence in Burmah, for eight years.

The first communication concerning the cure of “Arracan Fever” by this method, was received by me from Captain R. O. Lloyd, R.E., then Executive Engineer of the Sandoway District of Arracan, at whose request I sent half a dozen copies of my report.

SANDOWAY, ARRACAN, dated 6th July 1882.

"MY DEAR SIR,—I have to thank you for kindly sending me half a dozen copies of your pamphlet on the Carbonic Acid Gas treatment of fever. I heard of it at Kyoukphyoo, and wrote to the American Baptist Mission Press for the pamphlet, and they informed me that they had none, but had sent my letter on to you.

"I told the Civil Surgeon here about the cure, and he informed me that he had tried it on twelve cases without one failure."

Yours faithfully,

(Signed) R. O. LLOYD.

Some copies of the report had been sent to a Mr Statham, a resident chemist of Akyab, the headquarters of the Arracan Division, who after distributing them, wrote as follows:—

AKYAB, dated the 21st March 1882.

"MY DEAR SIR,—I have been asked by some people here to get more copies of your report on Carbonic Acid Gas treatment of fevers. Your treatment of fevers according to the principles you expound in your book, was tried here, and I am glad to say in every case the result was all that could be wished."

Yours truly,

(Signed) ALBERT A. C. STATHAM.

In conclusion and in support of the simplicity of this method of treatment, I shall add one more letter to illustrate the utility of this treatise on fever in the absence of a medical man. The following case was that of a child belonging to a railway official who resides at a station only visited periodically by a hospital assistant. The infant had been treated for a few days in the ordinary way, when its father applied to me for treatment, and in

reply, was sent some soda and acid powders, together with my report on the gas treatment. After a day's use of the remedy he wrote as below :—

OKEKHAN, dated the 26th January 1882.

“SIR,—I beg to state that my child is much better after giving him the soda and acid powders in the manner you prescribed. I beg to thank you very much for the pamphlet you sent me yesterday. I would be glad to purchase half a dozen copies for circulation amongst my fellow workmen in the jungle.

“Please recommend the Carbonic Acid Gas treatment to the railway manager (Mr H. M. Mathews) for use among the workmen in the jungle, and many will have cause to thank you.”

Your obedient servant,

(Signed) ROBERT ROWLAND.

Permanent Way Inspector.

The greatest care is necessary as regards attention to details of time at which to give the medicine and method of mixing the soda and acid, as given in the body of my report, if the quickest results are wanted.

If the gas treatment is resorted to in the jungles, order your chemist to send the powders in paper in separate well-stoppered bottles to prevent them from becoming damp—particularly in wet weather. Any of the effervescing remedies usually employed for their pleasant taste and laxative effect upon the bowels may be used if found more convenient. They must, however, be fresh and *effervesce very briskly*, or they are useless. If they purge too freely, the addition of a teaspoonful of Tincture of Catechu two or three times a day will prevent this excessive action. This over action of the bowels will not injure the ease if checked on the second day of fever, and may not occur at all if the small doses recommended are given.

I strongly recommend all whose duties call them out to malarious parts, to secure a small gazogene which they can charge with Carbonic Acid Gas themselves. By placing

the mouth to the pipe of the gazogene at which the aerated water issues, and taking four mouthfuls of this, a sufficient dose of the gas is obtained. The patient should always lie down as soon as he or she has swallowed the dose ; though there is no objection to rising an hour after the fourth dose (of each series of doses) has been taken.







